

Remarks

I. Status

Claims 1-5 and 10-45 are pending in the application. Claims 1, 5, 10, 18, 29, 32, 38, 42, and 45 are amended.

II. Telephone Interview

Applicants thank the Examiner for conducting a telephone interview on March 7, 2008.

During the Interview, the invention described by claim 1 was discussed in light of Klein, several proposed claim amendments were discussed. No agreement was reached.

III. Claim Rejections - 35 U.S.C. § 102

Claims 1-2, 10-11, 13, 26, 28-29, 31-32, 34-35 and 37-44 have been rejected under 35 U.S.C. 102(b) as being allegedly anticipated by U.S. Patent No. 5,873,101 ("Klein").

Amended Claims 1 and 10

Independent claim 1 defines a method for replicating data from a storage device. Claim 1 has been amended to require "identifying at least one data block comprising file data stored in at least one first memory location on a storage device" and "performing at least one read operation with respect to the at least one data block, the at least one read operation comprising performing at least one I/O access to the at least one first memory location on the storage device." Claim 1 has been further amended to require "recording, in one or more second memory locations different from the at least one first memory location, one or more I/O accesses performed with respect to the storage device in association with the at least one read operation." Claim 1 also requires "identifying, based on the recorded I/O access information, one or more

data blocks on the storage device that contain valid data” and “replicating the data blocks that contain valid data.” Support for the amendments to claim 1 is found at page 3, lines 7-17, for example.

Independent claim 10 is a system claim corresponding to claim 1, and has been amended in a similar manner.

Klein describes a method and system for backing up data and restoring data to a database. (Abstract). Data is stored in data segments comprising a plurality of blocks of data. Each data segment includes an “extent map” identifying the location and size of “extents” within the data segment. (Col. 4, lines 53-54). An extent is a logical storage structure including a specific number of contiguous data blocks. (Col. 4, lines 53-54).

Backing up a data segment from a first storage location to a second storage location in Klein involves copying the data blocks in the extents of each data segment, as well as the extent map, from a first location to a second location without analyzing the contents of either the data blocks or the extent map. (Col. 5, lines 1-6). Any suitable operating system routine or copy utility may be used to copy the data blocks. (Col. 5, lines 50-55). After the data blocks have been copied, location information in the data is corrected/updated. (Col. 5, lines 54-59). Therefore, it is important in Klein to maintain the original order of the data blocks in the extents so that location-dependent information contained in the data blocks can be accurately updated after it is copied. (Col. 5, lines 17-26).

Markers may be maintained within the extents to indicate boundaries between data blocks that have been allocated and are in use, and those allocated data blocks that have not yet been used. (Col. 5, lines 31-34). When data is copied during the backup procedure, the markers are used to ensure that only those allocated data blocks that are in use are copied. (Col. 5, lines 35-

39). The markers may be stored as part of the extent map, or in the data segment separate from the extent map. (Col. 5, lines 37-40).

Klein does not explicitly teach “performing at least one read operation with respect to the at least one data block, the at least one read operation comprising performing at least one I/O access to the at least one first memory location on the storage device” and “recording, in one or more second memory locations different from the at least one first memory location, one or more I/O accesses performed with respect to the storage device in association with the at least one read operation,” as required by claims 1 and 10. As discussed in the Fifth Amendment dated November 26, 2007 (the “Fifth Amendment”), there is no disclosure in Klein that the extent map, which indicates the locations of certain data blocks on a particular storage device, is generated based on recording one or more “I/O accesses” performed during a read operation on the that same storage device, as required by claims 1 and 10.

During the Interview, however, the Examiner asserted that it would be necessary in Klein to perform a read operation with respect to the extent map itself in order to identify where data is stored. However, such a read operation would not meet the limitations of amended claims 1 and 10, which require a “read operation” in a “first memory location” that is different from the “second memory locations” where I/O accesses are recorded. If the extent map constitutes the record of I/O accesses, as the Examiner alleges, then a read operation performed on the extent map itself involves the same memory location where the extent map is stored, not a different one, as claimed.

None of the other cited art teaches or suggests the combination of claims 1 and 10, either. Therefore, claims 1 and 10, and their respective dependent claims, are patentable over the cited art. The dependent claims include patentable limitations, as well.

Claim 29

Independent claim 29 defines a method to identify data blocks on a storage device that contains valid data. Claim 29 requires “identifying on a storage device at least one data block comprising file data,” “performing at least one read operation with respect to at least one data block,” and “recording one or more I/O accesses performed with respect to the storage device in association with the at least one a read operation.” Claim 29 also requires “generating a single list of all data blocks on the storage device that contain valid data based, at least in part, on the recorded I/O access information.”

As discussed in the Fifth Amendment, Klein also does not teach or suggest “generating a single list of all data blocks on the storage device that contain valid data based, at least in part, on the recorded I/O access information,” as required by amended claim 29. (Emphasis added). While Klein discloses an extent map (and markers) indicating where valid data resides within a particular data segment, nowhere does Klein teach generating a single list indicating all data blocks on a storage device that contain valid data, as claimed.

The Examiner failed to address this limitation in the Office Action. If the Examiner insists on maintaining the rejection, it is respectfully requested that the Examiner explain where this limitation is disclosed in Klein.

None of the other cited art teaches or suggests the combination of amended claim 29, either. Therefore, amended claim 29 and its dependent claims are patentable over the cited art. The dependent claims include patentable limitations, as well.

Independent Claims 32, 38, and 42

Each of the independent claims 32, 38, and 42 recites limitations similar to “performing at least one read operation with respect to the at least one data block, the at least one read operation comprising performing at least one I/O access to the at least one first memory location on the storage device” and “recording, in one or more second memory locations different from the at least one first memory location, one or more I/O accesses performed with respect to the storage device in association with the at least one read operation,” as recited by amended claim 1. For the reasons set forth, none of the cited art teaches or suggests these limitations.

Therefore, independent claims 32, 38 and 42, and their respective dependent claims, are also patentable over the cited art. The dependent claims include patentable limitations, as well.

IV. Claim Rejections - 35 U.S.C. § 103**A. Amended Claims 18, 20 and 25**

Claims 18, 20 and 25 have been rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over U.S. Patent No. 5,873,101 (“Klein”) in view of U.S. Patent No. 5,875,478 (“Blumenau”). Claim 18 is amended and the rejection is respectfully traversed.

Claims 18 and 20

Independent claim 18 defines an apparatus to replicate data blocks on a storage device that contain valid data. Claim 18 has been amended to require a storage device configured to “store data in one or more data blocks, wherein the storage device comprises a file system that identifies files stored on the storage device and storage location information for the respective files.” Claim 18 has also been amended to require a first processor configured to “record I/O

accesses performed with respect to the storage device in association with read operations.”

Claim 18 has been further amended to require a second processor configured to “perform read operations with respect to all files identified in the file system” and “instruct the first processor to record one or more I/O accesses performed with respect to the storage device in association with the read operations.” The first processor is further configured to “identify one or more data blocks on the storage device that contain valid data based, at least in part, on the I/O access information recorded by the first processor” and “replicate the data blocks that contain valid data.”

None of the cited art teaches or suggests a processor configured to “perform read operations with respect to all files identified in the file system,” as required by amended claim 18. (Emphasis added). The Examiner admits that Klein does not teach or suggest this limitation, on page 6 of the Office Action. Instead, the Examiner alleges that Blumenau discloses this limitation. The applicants respectfully disagree.

Blumenau discloses a data backup system that includes a backup application that determines when data to be backed up should be copied to a remote archive repository and makes read requests to make a copy of data on the host storage disk. (Col. 1, lines 50-59). The backup application also makes write requests to store the copy at the remote archive repository. The system also includes a backup system that receives the write requests and the copy of data and has a remote procedure call interface for transmitting the data to the remote archive repository. (Col. 1, lines 57-62).

Nowhere does Blumenau teach or suggest a processor configured to “perform read operations with respect to all files identified in the file system,” as required by amended claim

18. (Emphasis added). In the Office Action, the Examiner has alleged that this limitation is disclosed at column 4, lines 8-11. However, these lines merely state the following:

[...the function of the backup driver 30 is to] communicate with archive media system 24 and to transfer the blocks of information specified by file system 26. In this case, backup application 22 identifies a file to be backed up to file system 26, and file system 26 identifies the physical blocks that are to be backed up to backup driver 28.

The above passage discloses that the “backup application 22 “identifies a file to be backed up to file system 26,” but does not teach or suggest in any way that the “backup application 22,” or any other component of the Blumenau system, reads all of the files identified in the file system, as claimed. If the Examiner insists on maintaining the rejection, it is respectfully requested that the Examiner provide additional explanation as to where and how Blumenau teaches the limitation in question.

None of the other cited art teaches or suggests the combination of amended claim 18, either. Therefore, amended claim 18 and its dependent claims are patentable over the cited art. The dependent claims include patentable limitations, as well.

Claim 25

Claim 25 depends from amended claim 1. Amended claim 1 is patentable over the cited art for the reasons set forth above. Therefore, claim 25 is also patentable over the cited art.

B. Claims 3, 12, and 27

Claims 3, 12, and 27 have been rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Klein in view of U.S. Patent Application No. 2003/0195865 (Long). The rejection is respectfully traversed.

Claim 3 depends from independent claim 1. Claim 12 depends from independent claim 10. Claim 27 depends from independent claim 5. For the reasons set forth herein, claims 1, 5, and 12 are patentable over the cited art. (Claim 5 is discussed below). Therefore, dependent claims 3, 12 and 27 are also patentable over the cited art. The dependent claims include patentable limitations, as well.

C. Claims 4-5 and 14-17

Claims 4-5 and 14-17 have been rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Klein in view of U.S. Patent No. 5,668,971 (“Neufeld”). The rejection is respectfully traversed.

Claim 4, which depends from independent claim 1, is patentable over the cited art because claim 1 is patentable over the cited art, as discussed above. Claim 4 includes patentable limitations, as well.

Independent claim 5 has been amended to require “performing at least one read operation with respect to the at least one data block, the at least one read operation comprising performing at least one I/O access to the at least one first memory location on the storage device” and “causing the storage device to record, in one or more second memory locations different from the at least one first memory location, one or more I/O accesses performed with respect to the storage device in association with the at least one read operation.” For the reasons set forth above, none of the other cited art teaches or suggests these limitations. Therefore, claim 5 is also patentable over the cited art.

Claims 14-17, which depend from claim 10, are patentable over the cited art because claim 10 is patentable over the cited art, as discussed above. The dependent claims include patentable limitations, as well.

D. Claim 19

Claim 19 has been rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Klein in view of Blumenau in further view of Neufeld. The rejection is respectfully traversed.

Claim 19 depends from amended independent claim 18. For the reasons set forth herein, amended claim 18 is patentable over the cited art. Therefore, dependent claim 18 is also patentable over the cited art. The dependent claim include patentable limitations, as well.

E. Claim 21

Claim 21 has been rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Klein in view of Blumenau in further view of Long. The rejection is respectfully traversed.

Claim 21 depends from amended independent claim 18. For the reasons set forth herein, amended claim 18 is patentable over the cited art. Therefore, dependent claim 21 is also patentable over the cited art. The dependent claim include patentable limitations, as well.

F. Claims 30 and 33

Claims 30 and 33 have been rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Klein in view of U.S. Patent No. 6,757,778 (“Rietschote”). The rejection is respectfully traversed.

Claim 30, which depends from amended independent claim 29, is patentable over the cited art because amended claim 29 is patentable over the cited art, as discussed above. Claim 33, which depends from amended independent claim 32, is patentable over the cited art because amended claim 32 is patentable over the cited art, as discussed above. The dependent claims include patentable limitations, as well.

G. Claim 45

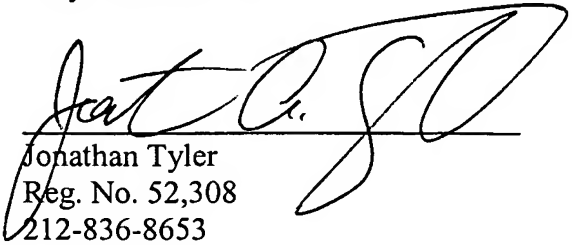
Independent claim 45 has been amended to require a first processor configured to “read each identified data block by performing at least one I/O access to the at least one first memory location on the storage device, until all data blocks containing valid data have been identified and read” and a second processor configured to “record, in one or more second memory locations different from the at least one first memory location, one or more I/O accesses performed by the storage device while the identified data blocks are being read.” For the reasons set forth above, none of the cited art teaches or suggests these limitations. Therefore, amended claim 45 is patentable over the cited art.

V. Conclusion

In view of the foregoing, each of claims 1-5 and 10-45, as amended, is believed to be in condition for allowance. Accordingly, reconsideration of these claims is requested and allowance of the application is earnestly solicited.

Respectfully submitted,
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